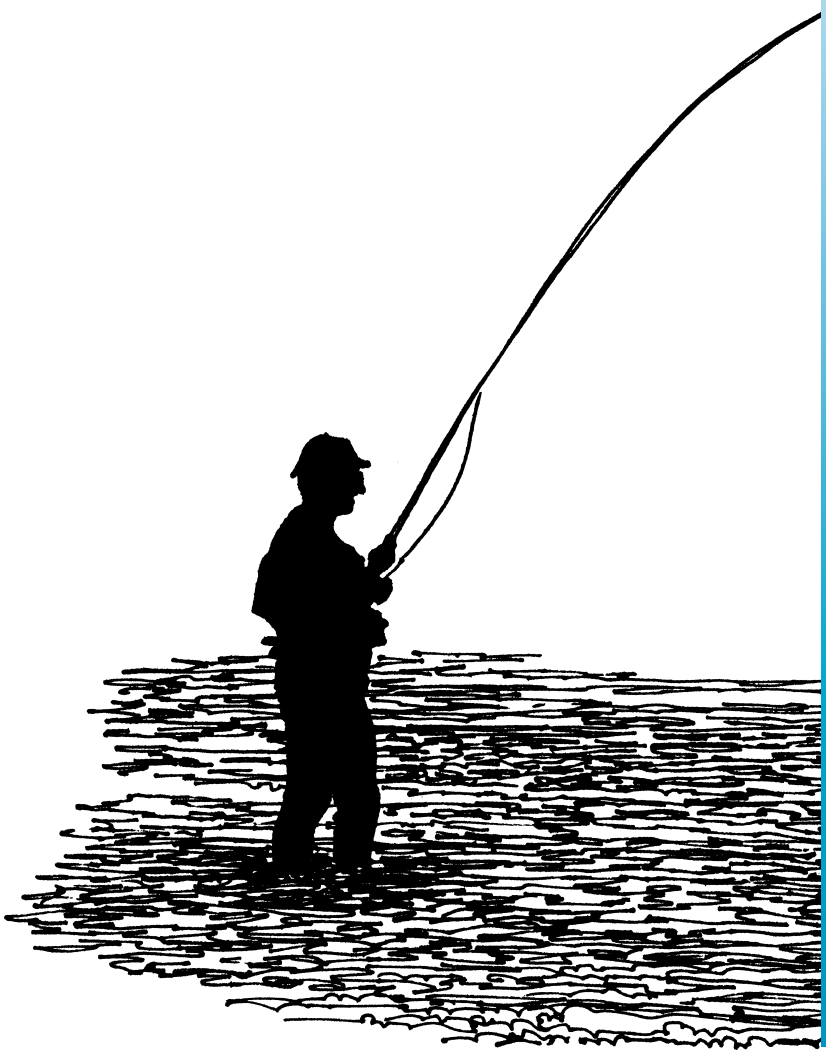
Alternatives Including the Proposed Action



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2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 Introduction

This section discusses the alternatives that were considered for analysis in this Environmental Impact Statement; identifies those excluded from further analysis with an explanation for why (Subsection 2.2); and describes those that have been considered for detailed analysis (Subsection 2.3). The National Environmental Policy Act requires consideration of all reasonable alternatives that fit the purpose and need for the proposed action (CEQ Regulations 1502.14; CEQ 40 Questions 1 and 2). The statement of purpose and need for the Proposed Action is provided in Section 1.3 of this Environmental Impact Statement.

The alternatives considered and analyzed in this Environmental Impact Statement were formulated based on scientific information, alternatives described in the settlement agreement in Washington Trout v. Lohn, and public comments received during scoping for the Environmental Impact Statement on the 2004 Puget Sound Chinook Harvest Resource Management Plan (Subsection 1.8).

The National Environmental Policy Act requires disclosure of how current environmental and social conditions would change with the Proposed Action and/or its alternatives. For this analysis, the Proposed Action (Alternative 1) most closely approximates current salmon harvest management practices and baseline environmental conditions, because the same type of harvest management plan has been implemented since 2000-2001 (CEQ 40 Questions, question 3).[i] Therefore, Alternative 1 is the baseline against which the environmental, social, and economic consequences of the action are compared. The predicted direct and indirect effects of alternatives on baseline environmental conditions (Alternative 1) are described in Section 4 of this Environmental Impact Statement, along with predicted cumulative effects on the natural, built and human environment when combined with other related actions.

[i] CEQ interprets the 'no action' alternative in two ways (CEQ 40 Questions, question 3):

1) For a continuing action, such as a long-term plan or program of action, the 'no action' is defined as 'no change' from current management direction or level of management intensity.
2) For a project, 'no action' is defined as 'the proposed activity would not take place, and the resulting environmental effects from taking no action would be compared with the effects of permitting the proposed activity or an alternative activity to go forward."

Fundamentally, these two interpretations are the same since each is intended to define the environmental baseline conditions that exist prior to implementation of the proposed action or its alternatives.

The criteria applied in narrowing the range of alternatives included:

- Relevance to the Action – Is the alternative consistent with the identified purpose and need for the Proposed Action?
- Redundancy – Is the primary characteristic of the alternative contained in another, broader, alternative?
- Environmental Considerations – Could the alternative effectively address conservation mandates of the subject jurisdictions? Could the alternative effectively address conservation concerns of the ESA?
- Technical Feasibility – Is there evidence or compelling reason to expect that the alternative approach would be technically feasible?

2.2 Alternatives Considered but Eliminated from Detailed Study

Three alternatives suggested in public comment received during scoping for the EIS on the 2004 Puget Sound Chinook Harvest Resource Management Plan or discussed during the internal consultation process were eliminated from further analysis. These include: 1) tribal-only fisheries, 2) no hatchery augmentation, and 3) exploitation-rate management. These alternatives were considered either outside the scope of this Environmental Impact Statement because they are not relevant to the Proposed Action, or they have been encompassed within alternatives analyzed in detail (Subsection 2.3, following). A more detailed explanation for why NMFS eliminated these alternatives from detailed study is provided in Subsections 2.2.1 through 2.2.3.

2.2.1 Tribal-Only Fisheries

A tribal-only fishing alternative was suggested during public comment. As described, this alternative would provide the 4(d) Rule take limitation on harvest activities only for treaty tribal fishing, would estimate the level of tribal fisheries required to satisfy federal trust responsibilities to the Puget Sound treaty tribes, and would configure those fisheries for all salmon species. This alternative is not consistent with the purpose and need of the Proposed Action. Since the purpose is to put in place a resource management plan under Limit 6 of the 4(d) Rule (i.e., a joint state-tribal plan), it would not be reasonable to expect that the Washington Department of Fish and Wildlife and the Puget Sound tribes would put forward a joint plan under Limit 6 that would include no provisions for non-tribal fishing. A fishery plan involving tribal-only fisheries would reasonably be expected to be provided to NMFS for evaluation under the Tribal 4(d) Rule.

2.2.2 No Hatchery Augmentation

A no-hatchery-augmentation alternative would assume that hatchery augmentation programs and the fish produced from those programs do not exist. It has been excluded from further detailed analysis because it is not reasonable or practicable. Even if the hatchery programs were discontinued in 2004, substantial numbers of hatchery fish from previous hatchery releases will return to Puget Sound in 2004 and over the next several years. It is not reasonable to expect that the co-managers would develop a resource management plan that did not provide for harvest of these hatchery fish, particularly since many of these fish were produced specifically for harvest. This alternative is also technically infeasible to assess with current tools and available data, since it is not yet possible to distinguish returning hatchery adults from wild adults for many Puget Sound chinook salmon populations. Finally, most of the reasons suggested for including this alternative (broodstock takes, prey competition, loss of genetic fitness, and migration barriers) are not affected by fishery activities. An analysis of harvest activities will only provide information about the change in escapement, catch and exploitation rate, and would not provide the information necessary to address the reasons given for the request. These issues would be more appropriately addressed in a National Environmental Policy Act analysis of proposed hatchery operations, if necessary. A pending National Environmental Policy Act review is currently under development for the Puget Sound salmon hatchery program. Fishery-related hatchery issues, such as straying and possible over-fishing, are addressed in the alternatives evaluated in this Environmental Impact Statement. Therefore, it is not necessary to develop and analyze an additional alternative in order to evaluate them.

2.2.3 Exploitation Rate Management

Under an exploitation-rate management alternative, Puget Sound and Strait of Juan de Fuca salmon fisheries would be managed for a constant total exploitation rate on each Puget Sound chinook management unit regardless of the expected abundance. This alternative is encompassed within the Proposed Action (Alternative 1). Therefore, a separate alternative to address this issue would be redundant and would not be consistent with the National Environmental Policy Act mandate to reduce excessive paperwork (CEQ Regulations 1500.4).

2.3 Alternatives Considered in Detail

Three alternatives are analyzed in detail in this Environmental Impact Statement. The alternatives selected for detailed analysis represent different frameworks from which to develop annual fishing regimes. They are meant to provide a flexible framework for managing fisheries to meet conservation and use objectives. They do not include the specific details of an annual fishing regime; i.e., where and

when fisheries occur, what gear will be used, or how harvest will be allocated among gears, areas or fishermen. Salmon abundance is highly variable from year to year, both among chinook salmon populations and other salmon species, due to changing environmental conditions. In addition, resource use objectives vary from year to year based on the concerns and needs of the stakeholder groups, which are also influenced by annual abundance and population status. These circumstances require managers to shape fisheries to respond to the population abundance and resource use conditions particular to that year. Therefore, each year, the co-managers would use the framework to develop annual fishing regimes for Puget Sound fisheries that are responsive to the year-specific circumstances related to the status of populations and other resource use objectives. Each alternative represents a distinctly different approach to setting management objectives, and each would have different outcomes in terms of escapement levels, harvest-related mortality, long-term resource protection, and harvest opportunity. These predicted outcomes are described in Section 4 of this Environmental Impact Statement. The following subsections describe the alternatives in more detail. More specificity about the technical assumptions and methods involved in analyzing each of the alternatives can be found in Appendix B. Table 2.3-1 summarizes the elements of the alternatives.

Before describing the alternatives in more detail, it is important to point out that Alternative 4 is inconsistent with several of the elements of the purpose and need for the Proposed Action described in Subsection 1.3, and would not be considered were it not one of the alternatives identified for analysis in the settlement agreement to Washington Trout v. Lohn. Alternative 4 is inconsistent with the purpose and need for the Proposed Action because it does not: 1) provide for the meaningful exercise of federally-protected treaty fishing rights; 2) provide for tribal and non-tribal fishing opportunity co-managed under the jurisdiction of U.S. v. Washington; or 3) optimize harvest of abundant Puget Sound salmon while protecting weaker commingled chinook salmon stocks. In addition, unless necessary for reasons of conservation, Alternative 4 is inconsistent with other legal mandates and policies related to treaty tribal fishing rights. It is unrealistic and unnecessary for the co-managers to engage in the regulatory burden of seeking coverage of their Puget Sound Chinook Harvest Resource Management Plan under Limit 6 of the 4(d) Rule with NMFS if that plan involved no take of listed chinook salmon, since actions that do not result in take of a listed species do not require consultation with NMFS.

Table 2.3-1. Comparison of alternatives considered for detailed analysis.

Element	Alternative 1 – Proposed Action/Status Quo	Alternative 2 – Management Unit Escapement Goal	Alternative 3 – Population Escapement Goal/ Terminal Fisheries Only	Alternative 4 – No Action/No Authorized Take
Management objectives	Exploitation rate ceilings Escapement thresholds	Fixed escapement goals	Fixed escapement goals	No take of listed chinook within the Puget Sound Action Area.
Focus of management	Weak population	Weak population	Weak population	Not applicable
Access	All marine and freshwater areas of Puget Sound	All marine and freshwater areas of Puget Sound	Freshwater areas only	Marine areas closed. Freshwater areas closed April–November.
Level of management	Management Unit, most managed for weakest population	Management Unit	Population	Not applicable
Protection of ESU diversity	Fisheries shaped to minimize timing, age, size selectivity	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1 for fisheries on other salmon that remain open.
Fishing at low abundance	Minimum Fishing Regime	No fishing	No fishing	No fishing
Monitoring	Fishery Monitoring Escapement Monitoring Biological Sampling Coastwide Coded-Wire-Tag Indicator Stock Program Smolt Production Monitoring	Monitoring would continue as in Alternative 1, although fishery monitoring in marine areas would likely be greatly reduced given the low expectation of fisheries in these areas.	Monitoring would continue as in Alternative 1, <u>except</u> fishery monitoring in marine areas would be eliminated.	Monitoring would continue as in Alternative 1, <u>except</u> fishery monitoring in marine areas would be eliminated and the biological sampling would likely be reduced.
Enforcement	Puget Sound-wide coverage in marine and freshwater areas	Same as Alternative 1 except marine patrols would probably be redirected when the likelihood of marine fisheries was low. Freshwater patrols as in Alternative 1.	Marine patrols redirected. Freshwater patrols as in Alternative 1.	Redirected to other natural resources.
Reporting	Fishery results Escapement estimates Biological sampling results	Reduced from Alternative 1.	Reduced from Alternative 1	Reduced or eliminated from Alternative 1.

Finally, existing case law provides that treaty tribal fishing can be limited for conservation purposes, but only if the associated legal standards are first met. Implementation of Alternative 4 would require closure of all salmon fisheries that took listed Puget Sound chinook salmon, including treaty tribal fisheries. In cases involving an activity that could raise the potential issue of a take under the ESA and further restriction of treaty tribal fishing, an analysis will be conducted to determine whether all of the following conservation standards have been met:

(i) the restriction is reasonable and necessary for conservation of the species at issue

(ii) the conservation purpose of the restriction cannot be achieved by reasonable regulation of non-Indian activities

(iii) the measure is the least restrictive alternative available to achieve the required conservation purpose

(iv) the restriction does not discriminate against Indian activities, either as stated or applied

(v) voluntary tribal measures are not adequate to achieve the necessary conservation purpose.

A thorough discussion of Tribal Rights and Treaty Trust Responsibilities is provided in Section 3.4 of this Environmental Impact Statement.

Therefore, Alternative 4, No Action/No Authorized Take, is included among the alternatives for detailed analysis because it was one of the alternatives included in the settlement agreement in Washington Trout v. Lohn. It provides an upper-bound estimate of the decrease in mortality on fish and wildlife species affected by Puget Sound salmon fisheries, and an upper-bound estimate of socio-economic effects.

2.3.1 Alternative 1 – Proposed Action/Status Quo

Alternative 1 represents the Puget Sound chinook harvest management framework proposed by the co-managers (Puget Sound treaty tribes and Washington Department of Fish and Wildlife). Although management objectives have been updated as new information has become available and the co-managers have continued to refine their approach, it is the same general management framework that has been implemented since 2000. All marine and freshwater areas currently fished[ii] would remain available under Alternative 1, subject to shaping by the co-managers to address conservation or use objectives. More detailed descriptions of these fisheries are provided in Subsection 1.6 of this

[ii] Not all freshwater areas are currently fished by the co-managers because of ongoing conservation concerns, or due to fisheries in the area being infeasible.

Environmental Impact Statement. The following discussion describes the approach of Alternative 1 in general detail. A detailed explanation of the management framework for individual management units is presented in the Resource Management Plan itself in Appendix A.

Under Alternative 1, Strait of Juan de Fuca and Puget Sound salmon fisheries would be managed for a mixture of management-unit-specific escapement thresholds and exploitation rate ceilings. The type of objective would vary by management unit (Table 2.3-2). Several of the management units encompass two or more populations. One half of these management units would be managed for the weakest population component, and fisheries within the Puget Sound Action Area would be managed to achieve the conservation objectives for the weakest chinook management unit. The exploitation rate objectives would be ceilings not targets. This means that fisheries in each year would not be shaped to achieve the exploitation rate ceilings but rather to not exceed them. In any particular year, fisheries may be managed for rates well below these ceilings. Fisheries in the Green, Skokomish and Nisqually Rivers would be managed to meet or exceed escapement thresholds. This means that in many years, escapements would be well above their escapement thresholds, although in some years escapement may fall below their thresholds due to management imprecision. However, the degree to which escapement deviates from the threshold varies from year to year depending on the management decisions and error in forecasted abundance[iii]. Except for the Nisqually River management unit, management units managed for escapement thresholds are also coupled with ceilings on exploitation rates in mixed-stock fisheries. When abundance is insufficient to meet the escapement thresholds, additional actions would be taken to come as close to the goal as possible.

[iii] Therefore, for the purposes of this analysis, fisheries have been designed to harvest all chinook above the escapement threshold in these systems.

Table 2.3-2. Puget Sound chinook resource management plan harvest conservation objectives: Recovery exploitation rates, escapement goals, critical abundance thresholds, and minimum fishing rates under Alternative 1.

Management Unit/ Population	Recovery Exploitation Rates	Upper Management Threshold	Low Abundance Threshold	Critical Exploitation Rate Ceilings
Western Strait of Juan de Fuca	10% SUS	850	500	6% SUS
Eastern Strait of Juan de Fuca Dungeness Elwha	 10% SUS 10% SUS	 925 2,900	 500 1,000	 6% SUS 6% SUS
Nooksack[2] North Fork South Fork	Under development	4,000[3] 2,000[3] 2,000[3]	 1,000 [3] 1,000 [3]	9% SUS anticipated to be 7% or less in 4 of the next 5 years
Skagit spring Upper Sauk Cascade Siuattle	38%	2,000 986 440 574	576 N/A N/A N/A	15% SUS even-years 17% SUS odd-years
Skagit summer/fall Upper Skagit Lower Sauk Lower Skagit	50%	14,500 8,434 1,926 4,140	4,800 2,200 400 900	18% SUS
Stillaguamish[2] North Fork summer South Fork fall	25%	900[3] 600[3] 300[3]	650 [3] 500 [3] N/A	15% SUS
Snohomish[2] Skykomish Snoqualmie	21%	4,600[3] 3,600[3] 1,000[3]	2,800 1,745 [3] 521 [3]	15% SUS
Lake Washington Cedar River	15% PT SUS	1,200[3]	200 [3]	12% PT SUS
Green	15% PT SUS	5,800	1,800	12% PT SUS
White River spring	20%	1,000	200	15% SUS
Puyallup	50%	500	500[4]	12% PT SUS
Nisqually		Terminal fishery managed to achieve 1,100 natural spawners		
Mid-Hood Canal Dosewallips	15% PT SUS	750	400	12% PT SUS
Skokomish	15% PT SUS	3,650 aggregate, 1,650 natural	1,300 aggregate 800 natural	12% PT SUS

Source: Puget Sound Indian Tribes and Washington Department of Fish and Wildlife (11/4/2003).

Exploitation rates expressed as:
SUS = Total, southern United States.
PT SUS = Pre-terminal southern United States. [1]

[1] A fishery that harvests significant numbers of fish from more than one region of origin. Does not include additional impacts in terminal fisheries.
[2] Managed for weakest population component.
[3] Natural-origin spawners.
[4] 500 adults to the South Prairie Creek index.

Under Alternative 1, all populations have low abundance thresholds[iv] and all management units have upper management thresholds[v] that trigger additional fishery responses when escapement is anticipated to be lower or higher than these thresholds (Table 2.3-2). For all management units, when abundance is projected to result in escapement below the low abundance threshold, or the amount of exploitation in Alaskan and Canadian fisheries would make it difficult or impossible to meet harvest objectives, exploitation rates in southern U.S. fisheries would be held to rates no greater than those rates defined by a minimum fishing regime (Table 2.3-2). The minimum fishing regime is designed to preserve an acceptable level of harvest opportunity on other salmon species and hatchery chinook stocks. As such, the minimum fishing regime is based primarily on policy interpretation of this acceptable level of harvest opportunity rather than primarily on biological considerations as is the case with the escapement thresholds and general exploitation rate objectives. The co-managers believe the minimum fishing regime achieves a balance of protection for the chinook salmon populations, preserves harvest opportunity on other salmon species and stronger chinook salmon stocks, and provides a minimum level of fishing that allows some exercise of tribal treaty rights. The status of several populations is such that they would be expected to be managed under the minimum fishing regime over the duration of the Proposed Action. The expected range of impacts on these populations is discussed in more detail in Section 4.3 of this Environmental Impact Statement.

Under Alternative 1, if after accounting for expected Alaskan and Canadian catches; and incidental, test, and tribal ceremonial and subsistence catches in southern U.S. fisheries; a management unit is expected to have a spawning escapement greater than its upper management threshold, and its projected exploitation rate is less than its exploitation rate ceiling objective, the amount in excess of the upper escapement threshold (harvestable surplus) would be considered to be available for targeted harvest. In that case, additional fisheries may be implemented until the exploitation rate ceiling is met or its expected escapement equals the upper management threshold. In other words, the primary objective of the fishery could be to harvest the amount in excess of the upper management threshold for that management unit, in addition to incidental harvest occurring in fisheries on other species or

[iv] These thresholds are set at levels below which concerns about demographic and genetic effects on population stability begin to arise. They are intentionally set above the level at which a population may become demographically unstable, or subject to loss of genetic integrity. More detail for each population can be found in Appendix A of the Puget Sound Chinook Comprehensive Management Plan – Harvest Management Component.

[v] These thresholds are intended to represent optimum productivity of the management unit or population. More detail for each management unit can be found in Appendix A of the Puget Sound Chinook Comprehensive Management Plan – Harvest Management Component.

hatchery chinook stocks. These fisheries are commonly called directed fisheries. Otherwise, Alternative 1 would prohibit directed harvest on listed populations of Puget Sound chinook salmon, unless they were expected to have harvestable surpluses. However, both directed and incidental fishery impacts would be constrained by the overall exploitation rate ceilings or escapement thresholds for each management unit (Recovery Exploitation Rates and Thresholds, Table 2.3.2). The co-managers expect that directed fishing under Alternative 1 during the 2004–2009 fishing seasons would be limited to occasional ceremonial and subsistence fisheries.

Fisheries would also be conducted in a manner that would minimize impacts to the diversity of chinook salmon populations within the Puget Sound Action Area. For example, to minimize potential size, timing, and age-selective effects resulting from terminal fisheries, pulsed (i.e., short-duration) openings would be scheduled over the duration of the run.

Monitoring

Alternative 1 includes monitoring provisions to collect biological data, validate assumptions, and assess the performance of the annual fishing regime. WDFW and the Puget Sound treaty tribes work together cooperatively to conduct the monitoring. The Puget Sound chinook salmon catch in all fisheries, including incidental catch, and fishing effort would be monitored and compared against pre-season expectations. Commercial catch in Washington waters would be recorded on sales receipts ('tickets'), copies of which would be sent to the Washington Department of Fish and Wildlife and tribal agencies, and recorded in a jointly-maintained database. Recreational catch in some areas in Puget Sound would be estimated in-season by creel surveys. Creel sampling regimes have been developed to meet acceptable standards of variance for weekly catch. For other Puget Sound fishing areas, recreational harvest would be estimated from a sample of catch record cards obtained from all anglers. The recreational fishery baseline sampling program would provide auxiliary estimates of species composition, effort, and catch per unit effort. For this program, the objectives would be to sample 120 fish per sampling group for estimation of species composition, and 100 boats per stratum (i.e., sampling group) for the estimation of catch per unit effort. Post-season comparison to actual catch is used to assess the true effect of regulations, and guides their future application or modification. Collection of scales, otoliths (bones in the head of a fish that indicate age), coded-wire tags, and sex and length data would occur to determine the age and size composition of the local population, and distinguish hatchery- and natural-origin fish.

Chinook escapement surveys in each river system would be implemented to estimate annual escapements, evaluate trends in escapement, and to describe the annual variation in the return timing of

chinook populations. Estimates of escapement and fishery exploitation rates would enable reconstruction of the abundance of annual chinook returns and, given the age composition of annual returns, would enable estimation of the abundance produced from a given brood year escapement. After adjustment to account for non-landed fish and natural mortality, these estimates of recruitment would define the productivity of specific populations.

Monitoring would include continued implementation of the coast-wide indicator stock program in Puget Sound, used to assess harvest mortality and distribution. Chinook salmon populations that are part of the indicator stock program include Nooksack River spring, Skagit River spring, Stillaguamish River summer, Green River fall, Nisqually River fall, Skokomish River fall, and Hoko River fall populations. Additional indicator stocks are being developed for Skagit River summer and fall, and Snohomish summer populations. Commercial and recreational catch in all marine fishing areas in Washington would be sampled to recover coded-wire tagged chinook. For commercial fisheries, the objective would be to sample at least 20 percent of the catch in each area, in each week, throughout the fishing season (Johnson 1990). For recreational fisheries, the objective would be to sample 10 percent of the catch in each month/area stratum for Marine Catch Areas 7 through 13 and 20 percent for Marine Catch Areas 4B through 6 (Milward 2003a; Milward 2003b).

Smolt production from several Puget Sound management units would be estimated to provide additional information on the productivity of populations, and to quantify the annual variation in freshwater (i.e., egg-to-smolt) survival. In general, traps are operated through the chinook salmon out-migration period (January–August). These estimates are essential to understanding and predicting the annual recruitment, particularly in large river systems where freshwater survival has shown wide variation.

Enforcement

The Washington Department of Fish and Wildlife and individual Treaty tribes are responsible for regulating harvest of fisheries under their authority, consistent with the principles and procedures set forth in the Puget Sound Salmon Management Plan (1985).

Each tribe exercises authority over enforcement of tribal commercial fishing regulations, whether fisheries occur on or off their reservation. In some cases, enforcement is coordinated among several tribes by a single agency (e.g., the Point-No-Point Treaty Council is entrusted with enforcement authority over Lower Elwha Klallam, Jamestown S'Klallam, and Port Gamble S'Klallam tribal fisheries). Enforcement officers of one tribal agency may be cross-deputized by another tribal agency,

where those tribes fish in common areas. Prosecution of violations of tribal regulations occurs through tribal courts and governmental structures. Enforcement officers would patrol all marine and freshwater salmon fisheries under Alternative 1 to enforce regulations and offer community outreach.

Reporting

The co-managers would write an annual report on Puget Sound chinook salmon fisheries management that they would use to inform future harvest management decisions (see Section 7 of the Resource Management Plan in Appendix A), and would provide this report to NMFS annually as part of the application of Limit 6. Annual review builds a remedial response into the pre-season planning process to prevent excessive fishing mortality levels relative to the conservation of a management unit. The report would include:

- A summary of the chronology and conduct of all fisheries within the co-managers' jurisdiction, comparing expected and actual fishing schedules, and landed chinook catch. Significant deviations from the pre-season plan would be highlighted, with a summary of in-season abundance assessments and changes in fishing schedules or regulations.
- Estimates of landed catch of chinook in all fisheries during the management year (May through April) compared with pre-season expectations of catch, including revised estimates of landed catch for the previous management year. The causes of significant discrepancies between expected and actual catch would be examined, with an objective to improving the accuracy of the pre-season projections.
- Results of non-landed mortality studies.
- Comparisons of spawning escapement for all management units to pre-season projections, with detail on individual populations reported, as possible. Escapements would be compared to escapement goals and critical escapement thresholds. Final and detailed estimates of escapement for the previous year would also be tabulated.
- A summary of coded-wire tag sampling rates achieved in the previous year, and a description of biological sampling (i.e., collection of scales, otoliths, and sex and size data) of catch and escapement.
- Annual, adult-equivalent exploitation rates for each management unit as data become available, and comparison of these rates to the preseason expected exploitation rates and ceilings.
- A report describing whether the annual goals of the Pacific Salmon Treaty agreements were achieved.

As part of Alternative 1, the results of the annual reports would be used to revise harvest management objectives and fishery actions to maintain consistency with the current productivity and capacity of the various chinook systems and to improve management accuracy. The primary intent of monitoring, evaluation and reporting is to provide a useful feedback loop to improve understanding of the status and ecology of the salmon populations and fisheries management.

2.3.2 Alternative 2 – Escapement Goal Management

Under Alternative 2, Puget Sound and Strait of Juan de Fuca salmon fisheries would be managed to achieve fixed escapement goals for each Puget Sound chinook management unit. All marine and freshwater areas currently fished[vi] would remain available under Alternative 2, subject to shaping by the co-managers to address conservation or use objectives. Under Alternative 2, fisheries would occur where the abundance of Puget Sound chinook management units passing through those areas were predicted to be in excess of their goals (Table 2.3-3). Although, there would be no general restriction on where the fish could be caught as long as the fisheries management units were meeting their escapement goals, the subsequent analysis in Section 4 demonstrates that, for the abundances expected to occur over the next six years, most fishing would be limited to terminal (freshwater) areas. Terminal areas are defined as locations containing only populations returning to a single river system; for example, the Skagit River. The reason for this is that fisheries in marine areas would encounter fish from a mixture of management units, some of which would not be anticipated to meet their escapement goals. Since fishing cannot occur on management units below their escapement goals under Alternative 2, fisheries in these areas would be closed.

In practice, under Alternative 2, fisheries would be managed to meet or exceed escapement thresholds for the Puget Sound chinook management units. This means that in many years, escapements would be well above their escapement thresholds, although in some years escapements could fall below their goals because of management imprecision. However, the degree to which escapement deviates from the threshold varies from year to year depending on the management decisions and error in forecasted abundance. Therefore, as with Alternative 1, for the purposes of this analysis, fisheries have been designed to harvest all chinook in excess of the escapement goal.

In general, the analysis of Alternative 2 assumes that the terminal fishery structure is the same as that of Alternative 1, and does not introduce any new fisheries that have not occurred in recent years, since this would be highly speculative. For example, non-tribal commercial fisheries do not presently occur in freshwater areas by agreement with the tribes, and due to a resource use decision to prioritize recreational fisheries in freshwater areas by the Washington Department of Fish and Wildlife. In the Strait of Juan de Fuca region, very limited harvest of chinook, coho, and steelhead would occur only in the Hoko River. In the North Puget Sound region, limited chum and steelhead fisheries would occur in

[vi] Not all freshwater areas are currently fished by the co-managers because of ongoing conservation concerns, or due to fisheries in the area being infeasible.

the Nooksack and Skagit Rivers. Available chinook abundance for the Stillaguamish management unit would allow a small chum fishery, moderate chinook, coho and pink fisheries in the Stillaguamish River and a small chum fishery in Tulalip Bay. The Tulalip Bay fishery is the only fishery outside terminal areas under Alternative 2. In the South Puget Sound region, available chinook salmon abundance would allow moderate fisheries for coho and chum salmon, and limited fisheries for pink salmon. In Hood Canal, available chinook salmon abundance would allow moderate fisheries for coho, pink and chum salmon relative to Alternative 1.

Table 2.3-3. Escapement goal objectives used to analyze Alternative 2 based on objectives provided by the co-managers.

Management Unit	Alternative 2 Escapement Goal
Western Strait-Hoko [1]	850
Dungeness Spring	925
Elwha	2,900
Nooksack Spring	4,000[2]
Nooksack/Samish summer-fall [1]	8,900
Skagit Spring	2,000
Skagit Summer/Fall	14,500
Stillaguamish	900[2]
Snohomish	4,600[2]
Tulalip Tribal Hatchery [1]	--
Lake Washington	1,550
Green-Duwamish	5,800
Puyallup	1,200
White Spring	1,000
Nisqually	1,100
Gorst, Grovers, Minter, Chambers & McAllister, Deschutes [1]	9,600
Mid-Canal	750
Skokomish	1,200
Hoodsport H, Dewato, Union, Tahuya tributaries. [1]	1,850

[1] Not defined as an independent population for the listed Puget Sound chinook Evolutionarily Significant Unit. Goals used to assess economic impacts of lost harvest opportunity.

[2] Natural-origin spawners.

Fisheries outside the Puget Sound Action Area, such as those under the jurisdiction of the Pacific Fisheries Management Council, including Marine Catch Area 4B from May to September, would continue to operate under Alternative 2.

Monitoring

With the elimination of almost all marine salmon fisheries under Alternative 2, monitoring programs associated with those fisheries would be eliminated. Monitoring of terminal fisheries, escapement, and smolt production would continue as described under Alternative 1.

Enforcement

With the elimination of almost all marine salmon fisheries, enforcement would be redirected from marine fisheries to terminal salmon fisheries or to other natural resources; such as, shellfish and wildlife.

Reporting

Reporting provisions would be the same as described for Alternative 1.

2.3.3 Alternative 3 – Escapement Goal Management at the Population Level with Terminal Fisheries Only

Alternative 3 is very similar to Alternative 2 except that 1) Puget Sound and Strait of Juan de Fuca salmon fisheries would be managed to meet population-specific escapement goal objectives rather than management unit-specific goals and, 2) salmon fisheries that would harvest listed Puget Sound chinook would not occur within the Puget Sound Action Area outside terminal areas of Puget Sound and the Strait of Juan de Fuca. Alternative 2 had no specific geographical constraints on where fisheries could occur[vii]. Populations are those defined by the Puget Sound Technical Recovery Team (NMFS 2003). There would be no fishing-related mortality of listed Puget Sound chinook for populations for which abundance was not expected to meet the escapement goal of the population (Table 2.3-4). Data were not available to derive a population-specific escapement goal for the North Lake Washington population because the data are too variable to derive a population dynamic relationship, and the contribution of hatchery strays is unknown. Lacking these data, the escapement goals for the Lake Washington management unit and the Cedar River population were used to represent probable effects of Alternative 3 on the North Lake Washington population. Both the Lake Washington Tributaries and Cedar River populations have the same type of life history and are subject to the same fisheries, so there is no reason to believe based on available information that the North Lake Washington Tributaries population and the Cedar River population are harvested in different locations or at

[vii] Abundance over the next 6 years is predicted to be below the escapement goal for most populations, effectively constraining fisheries to freshwater areas under the terms of Alternative 2. However, if abundance was predicted to exceed the escapement goals, fisheries could occur in marine as well as freshwater areas under Alternative 2. Under Alternative 3, however, fisheries would be explicitly constrained to freshwater areas.

different rates. Management for all individual populations rather than management units, the constraint to fish only in freshwater areas, the use of escapement goals as management objectives for all populations, and the elimination of harvest on listed chinook salmon populations or management units that do not meet their escapement goal, are the key differences between Alternatives 1, and Alternatives 2 and 3. For example, under Alternative 1, the three Skagit summer/fall chinook salmon populations would be managed for an exploitation rate ceiling. There would be no general restriction on where the fish could be caught as long as the fisheries in total did not exceed the ceiling and there is some level of harvest under all abundance conditions. Under Alternative 2, the three Skagit summer/fall populations would be managed for the management unit escapement goal, and no fishery-related mortality on listed Skagit summer/fall chinook would occur in Puget Sound fisheries when abundance was not expected to meet the escapement goal. Under Alternative 3, the three Skagit summer/fall chinook populations would be managed for individual escapement goals. Fisheries would only occur in terminal areas where and when abundance was anticipated to exceed the escapement goal.

It is important to note that under the Puget Sound Salmon Management Plan (1985), the co-managers established escapement goals only at the management-unit level, and not at the population level, except where there is only one population in the management unit. The Puget Sound Salmon Management Plan (1985) defines a stock (population) as "An anadromous salmonid population of a single population of a species migrating during a particular season to a specific fish production facility and/or to a freshwater system which flows into saltwater" (Puget Sound Salmon Management Plan 1985). The co-managers have interpreted this to mean that the smallest unit of management would be at the level of a river system (i.e., management unit), not tributaries within that river system, and in most instances, information on individual populations is very limited. In order to adopt population-specific management objectives for those management units that include multiple populations, formal agreement would be required between the co-managers. Therefore, the population-specific escapement goals defined under Alternative 3 are not official management objectives, but are used only for the purpose of analyzing this alternative.

Under Alternative 3, terminal fisheries would occur where Puget Sound chinook salmon abundance in excess of the goals were predicted (Table 2.3-4). Although in practice fisheries would be managed to meet or exceed the goals, as with Alternatives 1 and 2, for the purposes of this analysis, fisheries have been designed to harvest all chinook in excess of the escapement goal. In general, as under Alternative 2, the analysis of Alternative 3 assumes that the terminal fishery structure would be the same as that of

Alternative 1, and would not introduce any new fisheries that have not occurred in recent years even with the elimination of marine commercial fishing opportunities. Except for fisheries in Tulalip Bay and the Stillaguamish River, fisheries under Alternative 3 would be identical to those under Alternative 2. In the Strait of Juan de Fuca region, very limited harvest of chinook, coho, and steelhead would occur only in the Hoko River. In the North Puget Sound region, limited chum and steelhead fisheries would occur in the Nooksack and Skagit Rivers. Population abundance for the South Fork Stillaguamish population would not meet its escapement goal and so the Tulalip Bay and Stillaguamish fisheries that would occur under Alternative 2 would not occur under Alternative 3. In the South Puget Sound region, available chinook abundance would allow moderate fisheries for coho and chum salmon, and limited fisheries for pink salmon. In Hood Canal, available chinook abundance would allow moderate fisheries for coho, pink and chum salmon relative to Alternative 1.

Fisheries outside the Puget Sound Action Area, such as those under the jurisdiction of the Pacific Fisheries Management Council, including Marine Catch Area 4B from May to September, would continue to operate under Alternative 3.

Monitoring

With the elimination of marine salmon fisheries under Alternative 3, monitoring programs associated with those fisheries would be eliminated. Monitoring of terminal fisheries, escapement, and smolt production would continue as described under Alternative 1.

Enforcement

Enforcement would be redirected from marine fisheries to terminal salmon fisheries or to other natural resources; such as, shellfish and wildlife.

Reporting

Reporting requirements would be the same as described for Alternative 1.

Table 2.3-4. Escapement goal objectives used to analyze Alternative 3 based on objectives provided by the co-managers.

Management Unit/Population	Alternative 3 Escapement Goal
Western Strait-Hoko [1]	850
Dungeness Spring	925
Elwha	2,900
Nooksack Spring	
North Fork Nooksack	2,000[1]
South Fork Nooksack	2,000[1]
Nooksack/Samish summer-fall [1]	8,900
Skagit Spring	
Upper Sauk	986
Suiattle	574
Upper Cascade	440
Skagit Summer/Fall	
Lower Sauk	1,926
Upper Skagit	8,434
Lower Skagit	4,140
Stillaguamish	
North Fork Stillaguamish	600[5]
South Fork Stillaguamish	300[5]
Snohomish	
Skykomish	3,600[5]
Snoqualmie	1,000[5]
Tulalip Tribal Hatchery [1]	--
Lake Washington	
Cedar	1,200[5]
North Lake Washington tributaries	
Green-Duwamish	5,800
Puyallup	1,200
White Spring	1,000
Nisqually	1,100
Gorst, Grovers, Minter, Chambers & McAllister, Deschutes [2]	9,600
Mid-Canal	750
Skokomish	1,200
Hoodsport H, Dewato, Union, Tahuya tributaries. [2]	1,850

[1] Natural-origin spawners.

[2] Not defined as an independent population for the listed Puget Sound Chinook Evolutionarily Significant Unit. Goals used to assess economic impacts of lost harvest opportunity.

2.3.4 Alternative 4 – No Action/No Authorized Take

Under Alternative 4, fishing-related mortality of listed Puget Sound chinook would be eliminated in salmon fisheries within the Strait of Juan de Fuca and Puget Sound. Therefore, it is assumed that those salmon fisheries within the Puget Sound Action Area that harvested one or more listed Puget Sound chinook consistently from year to year would be closed. This would preclude all salmon fisheries in marine areas and most freshwater fisheries. The only fisheries open under Alternative 4 would be freshwater fisheries for chum from December through January, and freshwater fisheries for steelhead from December through March. This would result in limited chum and/or steelhead fisheries in the Strait of Juan de Fuca tributaries, Nooksack, Skagit, Green, and Skokomish Rivers. It is assumed that the catches of chum and steelhead salmon species would be similar to those observed in recent years (1996-2001).

Fisheries outside the Puget Sound Action Area, such as those under the jurisdiction of the Pacific Fisheries Management Council, including Marine Catch Area 4B from May to September, would continue to operate under Alternative 4.

Monitoring

With the elimination of salmon fisheries under Alternative 4, monitoring programs associated with those fisheries would be eliminated. Core programs like escapement surveys, and smolt production monitoring would continue. Collection of biological data might continue, but in situations of past revenue constraint, have been substantially reduced or eliminated.

Enforcement

Without fishery regulations to enforce under Alternative 4, the enforcement program for fisheries would be redirected to other natural resources such as shellfish and wildlife. Officers would cite illegal fishing when encountered, but it would be unlikely to be a focused effort.

Reporting

The reporting element would be greatly reduced by the co-managers under Alternative 4, as they would turn their focus to management of other resources. However, it is likely that the reporting of escapement, escapement trends, and some of the other core biological information would continue.